



## CHAPTER 12

# MS Access

## 12. MS Access

### 12.1 Introduction to Database Management System

A **Database Management System (DBMS)** is a collection of a set of programs and interrelated data to access those data. This is a group of correlated data with an inherent meaning and hence is a database.

In a simple manner, 'Database is a collection of related data and data is a collection of truths and statistics that can be processed to produce information'. The primary task of a DBMS is to provide a way to store and retrieve database info that is both suitable and efficient.

For example, consider the Name, Mobile Number, e-Mail and Home Address of the people user know. User may have recorded this data in an indexed telephone book, or User may have stored it on a diskette, using a personal computer and software such as Microsoft ACCESS or EXCEL.

A **datum** 'a unit of data' is a symbol or a super set of symbols which is used to represent something. This correlation between symbols and what they represent is the principle of what we mean by **information**. **Knowledge** denotes to the practical use of information. While information can be stored or shared without many complications the same cannot be said about knowledge. Knowledge essentially involves a personal experience.

**Database systems** are designed and developed to manage large bodies of information. Management of data involves both defining structures for storage of information and providing mechanisms for the manipulation of information. In totaling, the database system must ensure the protection of the information stored, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results.

#### 12.1.1 Characteristics

- **Real Entity:** A DBMS is more realistic and uses real entities to design its architecture. It

uses the behavior and attributes. For example, a college database may use applicant as an entity and their name as an attribute.

- **Relation based Structure:** DBMS allows entities and relations between them to form tables. A user can understand the architecture of a database just by seeing at the table names.
- **Inaccessibility of Data and Application:** A database system is totally different than its data. A database is an active entity, whereas data is supposed to be passive, on which the database works and organizes. DBMS also stores **metadata**, 'which is data about data', to ease its own process.
- **Lowest Redundancy:** DBMS follows the rules of **normalization**, which splits a relation when any of its attributes is having redundancy in values.
- **Consistency:** Consistency is a state-run where every relation in a database remains consistent. There exist techniques and methods, which can detect attempt of leaving database in inconsistent state.
- **Query Languages:** DBMS is equipped with query languages, which makes it more resourceful to retrieve and manipulate data. A user can be apply as many and as different filtering options as mandatory to retrieve a set of data.
- **ACID's Properties:** DBMS follow the concept of Atomicity, Consistency, Isolation, and Durability. These concepts are applied on transactions, which manipulate data in a database. ACID properties support the database stay healthy in multi-transactional environments and in case of failure.
- **Concurrent and Multiuser Access:** DBMS supports multiuser environment and allows them to access and manipulate data at same time. Though there are limitations on transactions when users attempt to handle the same data item, but users are always unaware of them.
- **Multiple Views:** DBMS offers multiple views for different users. A user who is in the Account department will have a different view of database than a person working in the Production department. This feature enables the users to have a concentrate view of the database according to their requirements.
- **Security:** Features like multiple view offer security to some extent where users are unable to access data of other user and department. DBMS offer methods to impose constraints while entering data into the database and retrieving the same at a later stage. DBMS offers many different levels of security features, which enables multiple users to have different

views with different features.

### 12.1.2 Advantages of DBMS

- **Data Independence:** Application programs will be as independent as possible from details of data representation and storage. The DBMS can provide an abstract view of the data to insulate application code from such details.
- **Efficient Data Access:** A DBMS utilizes a variety of sophisticated technique to store and retrieve data efficiently. This feature is especially important if data is stored on external storage devices.
- **Data Security and Integrity:** If data is always access through the DBMS, the DBMS can enforce integrity constraint on the data. For example, before inserting payment information for a vendor, the DBMS can check that the department budget is not exceeded. Also, the DBMS can enforce access controls that govern what data is visible to different classes of users.
- **Reduced Development Time:** The DBMS supports many important functions that are common to many applications accessing data stored in the DBMS. This, in conjunction with the high-level interface to the data, facilitates quick development of application.

### 12.1.3 Disadvantages of a DBMS

- **Complexity:** A database system creates additional complexity and requirement. The supply and operation of a database management system with several users and database is quite costly and demanding.
- **Skilled Personnel:** The professional operation of a database system requires suitably trained staff. Without a qualified database administrator nothing will work for long.
- **Cost:** Through the use of a database system new cost are generated for the organization itself but also for additional hardware and the more complex handling of the system.
- **Lower Efficiency:** A database system is a multiuse software which is often less efficient than specialised software which is produced and optimized exactly for one problem.

### 12.1.4 Instances and Schemas

Database change over time as information is inserted, updated and deleted. The collection of information stored in the database at a certain moment is called an instance of the database. The overall design of the database is called the database schema.

Data Models

Data models define how the logical structure of a database is modeled. Data Models are fundamental entities to introduce abstraction in a DBMS. Data models define how data is connected to each other and how they are processed and stored inside the system.

Entity-Relationship Model (ER Model)

Entity-Relationship (ER) Model is based on the notion of real world entities and relationships among them. While formulating real-world scenario into the database model, the ER Model create relationship set, entity set, general attributes and constraints. ER Model is best used for the conceptual design of a database.

ER Model is based on:

- a) Entities and their attribute.
  - b) Relationship among entity.
- These concepts are explained below.

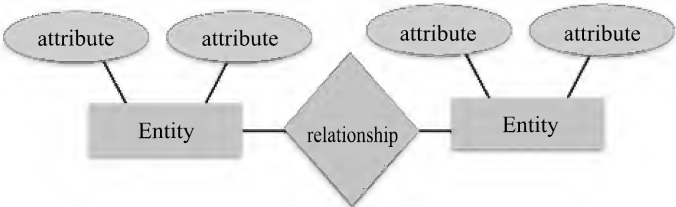


Figure 12.1: - ER Model

Entity:

An entity in an ER Model is a real world entity having property called attributes. Every attribute is defined by its set of values called domain. For example, in a **College** database, a **Student** can be one of the entities. **Student** entity can have attributes like Name, Father's Name, DOB, Sex, Class, etc.

Relationship:

The logical association among entity is called relationship. Relationships are drawn with entities in various ways.

Mapping cardinalities (as given below) define the number of association between two entities.

One to One 1:1	A diagram showing two rectangular boxes labeled 'Entity'. A diamond-shaped box labeled 'Relationship' is positioned between them. A line connects the left 'Entity' box to the 'Relationship' diamond, with a '1' at the connection point. Another line connects the right 'Entity' box to the 'Relationship' diamond, also with a '1' at the connection point.
One to Many 1:N	A diagram showing two rectangular boxes labeled 'Entity'. A diamond-shaped box labeled 'Relationship' is positioned between them. A line connects the left 'Entity' box to the 'Relationship' diamond, with a '1' at the connection point. Another line connects the right 'Entity' box to the 'Relationship' diamond, with an asterisk '*' at the connection point.
Many to One N:1	A diagram showing two rectangular boxes labeled 'Entity'. A diamond-shaped box labeled 'Relationship' is positioned between them. A line connects the left 'Entity' box to the 'Relationship' diamond, with an asterisk '*' at the connection point. Another line connects the right 'Entity' box to the 'Relationship' diamond, with a '1' at the connection point.
Many to Many N:N	A diagram showing two rectangular boxes labeled 'Entity'. A diamond-shaped box labeled 'Relationship' is positioned between them. A line connects the left 'Entity' box to the 'Relationship' diamond, with an asterisk '*' at the connection point. Another line connects the right 'Entity' box to the 'Relationship' diamond, also with an asterisk '*' at the connection point.

Table 12-1 Type of Relationship between 02 entities

## **Relational Model:**

The most popular and used data model in DBMS is the Relational Model. It is more scientific model than others. Informally, the relational model consists of:

- A class of data structures referred to as tables.
- A collection of methods for building new tables starting from an initial collection of tables; we refer to these methods as relational algebra operations.
- A collection of constraints imposed on the data contained in tables.

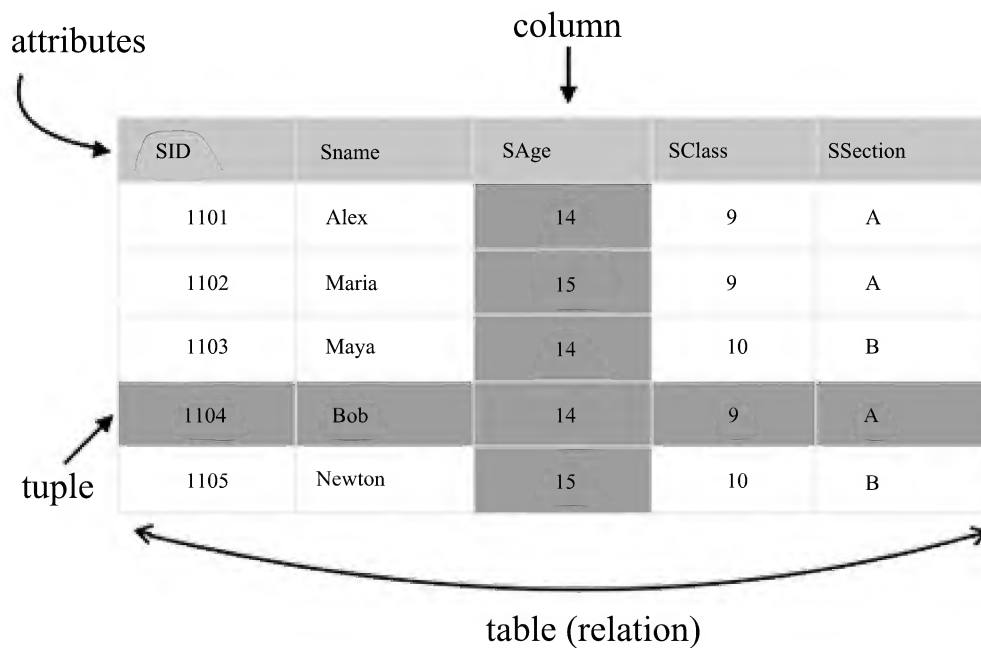


Figure 12.2: - Relational Model

## **12.2 Microsoft Access 2010**

### **12.2.1 Introduction**

Microsoft Access 2010 is a powerful relational database management software that can be used to track, share and report data as well as information. It provides access to a huge library of professionally designed templates, wizards that automatically create tables, forms, queries, and reports.

## 12.2.2 Starting Access

User can start MS Access 2010 from the Start menu or by opening an existing MS Access file. When user start the program without opening a specific file of access, the backstage view open, prompting user to create a new database.

**To start MS Access 2010 from the Start menu:**

1. Click the **Start** button, click on **All Programs**, click on **Microsoft Office 2010**, and then click **Microsoft Access 2010**. The **New** page of the **backstage** view open, displaying thumbnails of the available template and template categories (see Figure below).
2. Under **Available Templates**, click **Blank database**.
3. Click the **Create** button. A blank database opens in the program window and a blank table named **Table1** opens in **Datasheet** view.



Figure 12.3 – Backstage View

## 12.2.3 Overview of the User Interface

All the MS Office 2010 programs share a common user interface, so you can also apply basic technique that you learn in one program to other programs. The MS Access 2010 program window is easy to use and navigate (see Figure below).



Figure 12.4 – User Interface

Name	Description
Title bar	Appears at the top of the MS Access window and displays the name of database file and file path. The buttons on the right side of the Title bar are used to minimize, restore, and close the access window.
Quick Access toolbar	Appears on the left side of the Title bar and contains frequently used commands that are independent of the tab displayed on the Ribbon menu.
Ribbon	Extend across the top of the access window, directly below and down line the Title bar, and consists of a set of tabs, each of which contains groups of related commands.
Navigation pane	Appears on the left side of the access window and displays a list of all the objects in a current database.
Object window	Appears below the Ribbon and displays open database objects.
Status bar	Appears at the bottom of the program window and displays information about the database and provides access to certain program functions.

Table 12.2 MS-Access 2010 GUI Elements

## Navigation Pane

The Navigation pane is a central location from which user can easily view and access all users database objects (see Figure below). By default, it appears on the left side of the access window and displays all the objects in the database, grouped by object type and sorted by object name. When the list of object is longer than can be display within the height of the Navigation pane, Access also provides a scroll bar.



Figure 12.5 – Navigation Pane and Menu

User can expand and collapse the group in the list by clicking the section bar. User can also change the display in the Navigation pane by clicking on the pane's Title bar and selecting a different categories or filter from the menu. The user can minimize the Navigation pane to maximize the amount of screen area available to work with opened database

objects. Clicking on the Shutter Bar Close button in the upper right corner of the pane makes it appear as a thin bar on the left side of the access window.

Clicking on the Shutter Bar Open button at the top of the minimized pane expand it. User can also drag the right edges of the Navigation pane to the right or left to make it narrower or wider.

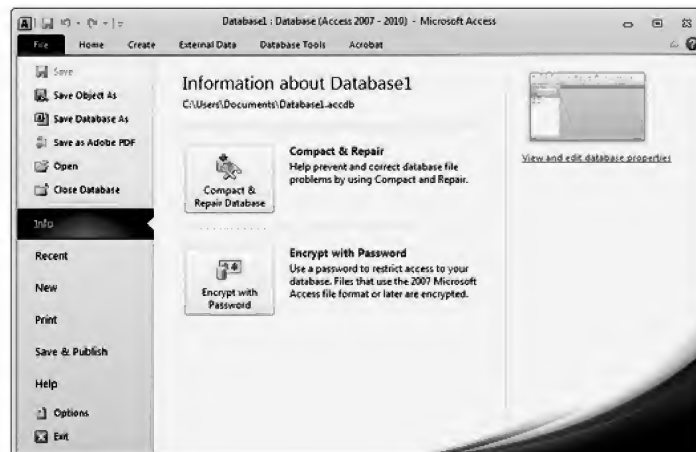


Figure 12.6 – Info Page of the Backstage View

## BackstageView

The File tabs used to display the Backstageview which contains all the options related to managing file and customizing the access program. It provides a way to open, create, save, print and close files, view and update file property, find recently used file, set permission, set program option, get help, and exit from the access program.

User can display the Backstage view at any time by clicking on the File tab on the Ribbon. User can exit the Backstage view by pressing the Esc key or by clicking any tab on the Ribbon.



## 12.3 Working with Database & Tables


### 12.3.1 Creating a New Database

A database needs to be created before a table is created in the database. When a user creates a new database, user creates a file that acts as a container for all objects in user database. MS Access 2010 comes with a variety of templates that can be leveraged to speed up the database creation process. A template is a ready to use database that contains all tables, forms, queries and reports needed to perform a particular task. If none of the templates meet user needs, user can build a database from scratch by using and creating a blank database, and then adding user's own tables and other database objects.

#### USEFUL TIP

MS Access 2010 creates database in the .accdb file format which was introduced in MS Access 2007. A database in this file format cannot be open by using version of MS Access earlier than MS Access 2007. If user need to share users database with other users who use MS Access 2003 or earlier, user must use the .mdb file format.

#### To create a New Database:

1. Click on the File tab then click on New. The New page of the Backstage view opens and displays thumbnails of the available template categories (see Figure below).
2. Under Available Templates, click on Blank database.
3. In the File Name box, type a required name for the database.
4. Click on the Browse button  next to the File Name box. In the File New Database box, select the folder where user wants to save the database, and click on the OK button. The path to the specific folder is displayed below the File Name box.
5. Click on the Create button. A blank database opens in the access window and a blank table with name as named Table1 opens in Datasheet view (see Figure below).
6. Click on the Close button in the upper right corner of the Object window of MS Access.

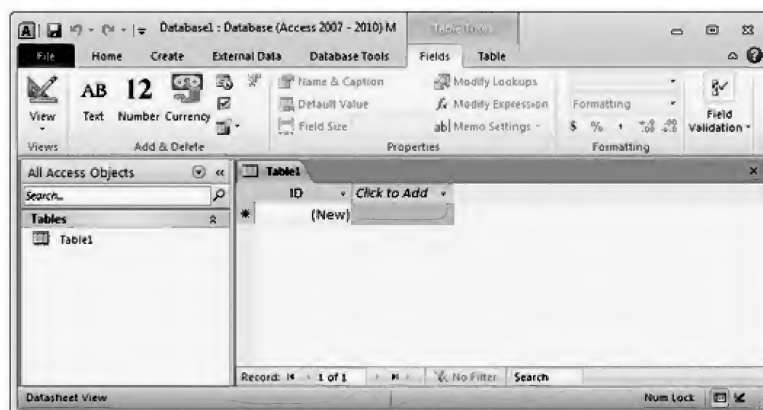


Figure 12.7– New Table in a New Database

## USEFUL TIP

- User cannot create any blank database without saving it. If user does not provide a file name and a location, MS Access saves the file with the name Database followed by in sequence number in the Documents folder.
- File name cannot contain the following characters: greater than sign(>), less than sign(<), asterisk(\*), question mark(?), quotation mark("), forward slash(/), backslash(\), pipe symbol(|), and colon(:).
- If user closes Table1 at this point, MS Access will not prompt user to save the table because it contains no data and it has no structure of information. The simple way to make the table part of the database is to create at least one record by entering data into the table, which concurrently defines the table's structure.

A table is a primary object of a database that user defines and uses to store data. A table contains information about a particular subject. A table consists of records and fields. Each record contains data about one instance of the table. Each record consists of one or more fields. Each field contains data about one aspect of the table subject (such as a Student's First Name or email Address).

In the Data sheet view in MS Access, a table looks very similar to an MS Excel work sheet where data is stored in rows (records) and columns (fields). The first row contains column header (field name). In this format, the tables are often simply referred to as a datasheet (see Figure below).

ID	Company	Last Name	First Name	E-mail Address	Job Title	Business Phone
1	Company A	Bedecs	Anna		Owner	{123}555-0100
2	Company B	Gratacos Solsona	Antonio		Owner	{123}555-0100
3	Company C	Axen	Thomas		Purchasing Representative	{123}555-0100
4	Company D	Lee	Christina		Purchasing Manager	{123}555-0100
5	Company E	O'Donnell	Martin		Owner	{123}555-0100
6	Company F	Pérez-Olaeta	Francisco		Purchasing Manager	{123}555-0100
7	Company G	Xie	Ming-Yang		Owner	{123}555-0100
8	Company H	Andersen	Elizabeth		Purchasing Representative	{123}555-0100
9	Company I	Mortensen	Sven		Purchasing Manager	{123}555-0100

Figure 12.8 – Datasheet View

When the active object of database is a table, the Table Tool contextual tab (Field and Table) becomes available on the Ribbon so that user can work with the table (see below figures).

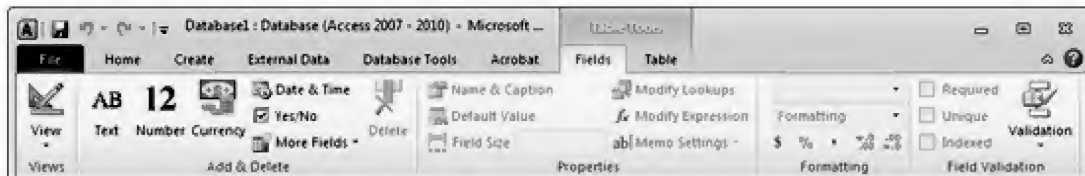


Figure 12.9 – Table Tool Tab



Figure 12.10 – Table Tool Tab

## 12.3.2 Creating Tables

When user creates a new table, the user has complete control over the number of fields, the name of the fields, and what sort of data and information they can store. User can create a new table in either Design view or Datasheet view by using the options as given below:

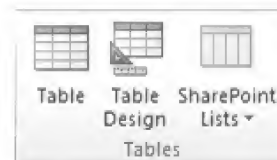



Figure 12.11 – Creating Table

Regardless of which view user start in, user can always switch to the other view by using the View button on the Ribbon or by clicking the various views buttons on the View Shortcuts toolbar.

### 12.3.2.1 Creating a Table in Datasheet View

In Datasheet view, you can enter data into a new table without first defining the table's structure.

**To create a table in Datasheet view:**

On the Create tab, in the Tables group, click on the Table button.  A new, blank table opens in the Object window in Datasheet view (see Figure below)

#### Adding Fields (Columns) by Entering Data

Entering data in Datasheet view is similar to entering data in an MS Excel worksheet. The main restriction is that data must be entered in attached rows and columns, starting in the upper left corner of the datasheet. The table structure is created while user enters data. Any time user adds a new column to datasheet, a new field is defined in table.



Figure 12.12 – New Table in Datasheet View

In each new table created in Datasheet view, MS Access automatically creates the first field, called as ID, in the left column of the datasheet. By default, this field is designated as the primary key and is planned to contain an entry that will uniquely identify the record, the data types of this field is set to Auto Number which means that MS Access will automatically enter in sequence number in this field for each new record user adds. User can add a new field to the table by entering data in the Click on the Add column (the last column) of the datasheet, MS Access will automatically assign a data type base on the data that user enters.

1. Click in the first cell in the Click on the Add column, enter the first item of data or information for the new record, and then press the Tab or Enter key to move to the first cell in the column to the right. MS Access assigns the value 1 to the ID field, assigns the name Field1 to the second field, and moves on the Click to

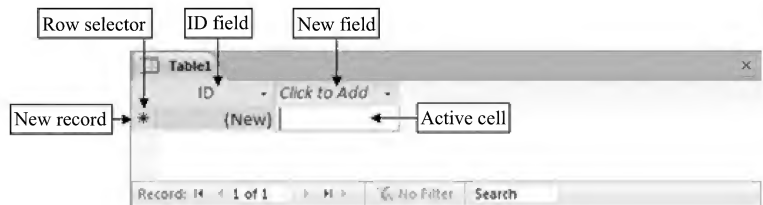


Figure 12.13 – First Record in a New Table before Data is Entered

### USEFUL TIP

When creating a new table in the Datasheet view, user needs to save the first record after entering the first item of data. If user does not, MS Access increments the ID value for each field user adds to that record.

2. Click on the Pencil icon in the row selector. This saves the first record with the value 1 assigned to the ID field, subsequent Ids will have incremental (incremented by 1) values.
3. Continue entering item of data in consecutive cell, and pressing the Tab or Enter key.
4. When user finishes entering all the data for the first record, click anywhere in the row below to save the record.

### Renaming Fields

When user adds a field by entering data or information in Datasheet view, MS Access automatically assigns a generic name to the field. MS Access assigns the name **Field1** to the first field, **Field2** to the second field, and so on (see Figure below). By default, a field name is used as its label wherever the field is displayed (such as a column header on a datasheet). It is important to rename these fields to more meaningful names so that a user can connect with these when the user

view / edit the Table.

**To rename a field in Datasheet view**

1. In the Object window, double click the field name, type the new name as required, and then press the Enter key.



The screenshot shows a table window titled 'Table1'. It has four columns: 'ID', 'Field1', 'Field2', and 'Click to Add'. Each column has a small dropdown arrow next to its header.

Figure 12.14 – Table with Generic Field Names

**USEFUL TIP**

Field and Table names can be up to 64 characters longer. They can include any combination of space, letter, number, and special character. Exclamation point (!), Period (.), Grave accent (`), and Brackets ([ ]) are not allowed.

**12.3.2.2 Creating a Table in Design View**

When user creates a table in Design view, user has more control over the database design. User first creates the new table's structure in Design view and then user can switch to Datasheet view to enter data.

In the Design view, the Object window consists of two panes (see Figure below). The Field Entry pane, located at the top of the object window, is used to enter each field's name, data type, and description. The Field Properties pane, located at the bottom of the object window, is used to specify the field properties. The property available in the Field Property pane depends on the data type assigned to the selected field. On the right side of the Field Property pane is a box in which MS Access displays information about field or property.

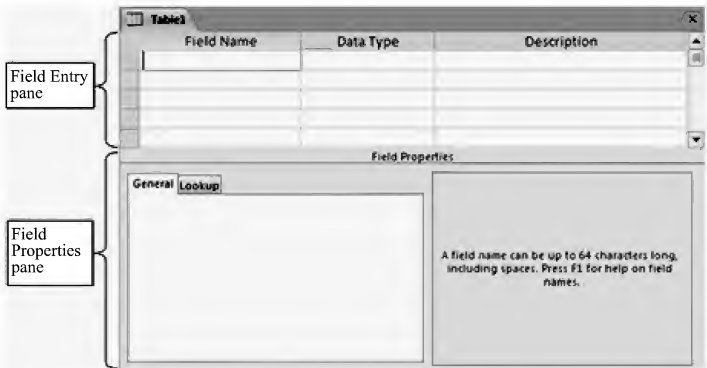


Figure 12.15 – New Table in Design View

**To create a table in the Design view:**

On the Create tab, in the Table group, click on the Table Design button. A new blank table opens in the Object window in the Design view (see Figure below).

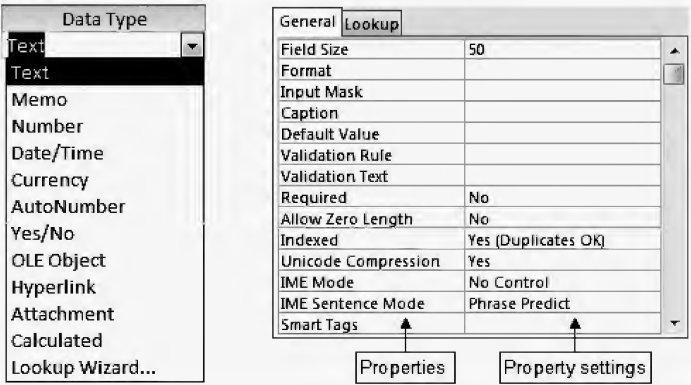


Figure 12.16 – Data Types and Properties List

## Defining Fields

Every Table consists of fields or columns. Each field has a set of property that controls the way it store, handle, and display data (e.g., field size, input mask, format, default value). A field data type is the most important property because it determines what kind of data a field can store (see Table below for a description of each data type).

In the Design view, user creates a new field by entering the field name, specifying the field data type and specifying its other properties. The field name uniquely identify the field within a table. The field description indicates the field purpose and is optional. The field data type determines which other properties user can set. MS Access automatically assigns default field properties which user can modify as needed.

### USEFUL TIP

The order in which the field names appear in the Design view determines the order in which the columns appear in the Database view.

Data Type	Usage
Text	Text is the <b>default data type</b> in MS Access. Text fields accept either text data or numeric data, including delimited lists of items (up to 255 characters).
Memo	User can enter large amounts of text data and numeric data in this type of field (up to 65,538 characters). Also, if the field is set to support rich text format, user can apply the types of format that user normally finds in word processing programs such as MS Word.
Number	User can enter only Numbers and user can perform calculations on the values in a Number field.
Date/Time	User can enter only Data & Time.
Currency	User can enter only currency values. User do not have to manually enter a currency symbol. By default, MS Access applies the currency symbol (\$, ¥, £, and so on) as specified in users' Operating System (OS) regional settings.
AutoNumber	User cannot enter or change the data in this type of field. MS Access increments the values in an Auto Number field whenever user adds a new record to a table.

Yes/No	When a field is set to this data type, MS Access displays either a check box or a drop down list, depending on how user format the field. If user format the field to show a list, user can select either Yes or No, True or False, or On or Off from the list, again depending on the format applied to the field. User cannot enter values in the list or change the values in the list directly from a form or table.
OLE Object	User use this type of field when user want to display data from a file created with another program.
Hyperlink	User can enter any data in this type of field and MS Access adds http:// to user's text. If user enters a valid web address, user link will work. Otherwise, user link will result in an error message.
Attachment	User can attach data from other programs to this type of field, but user cannot type or otherwise enter text or numeric data.
Calculated	This data type lets user create a field that is based on a calculation of other field in the same table.

Table 12.3 Field Types in MS Access 2010

### Setting a Primary Key

A primary key consists of one or more fields that uniquely identify each record in a table. There are several advantage to setting a primary key. First, the Primary Key is automatically indexed, which makes information recovery faster. Second, when user opens a table, the records are automatically sorted in order by the Primary Key. Finally, a Primary Key avoids the entry of duplicate data in a Table.

When user creates a new table in Datasheet view, MS Access automatically creates a primary key for user and assigns it a fieldname of ID and the Auto Number data type. In the Design view, user can change or remove the Primary Key, or set the primary key for tables that does not already have one.

To set a primary key:

1. Click on the row selector of the field user want to designate as the primary key.
2. On the Design tab, in the Tool group, click on the Primary Key button. A key icon appear to the left of the field that user can specify as the Primary Key.

#### USEFUL TIP

To select more than one field, hold down the Ctrl key and click the row selector of each field.



Figure 12.17 – Tools Group on the Design Tab

### 12.3.3 Saving Table

After user creates or modifies a table, user shall save it. When user saves a table for the first time, user shall give it a meaningful name.

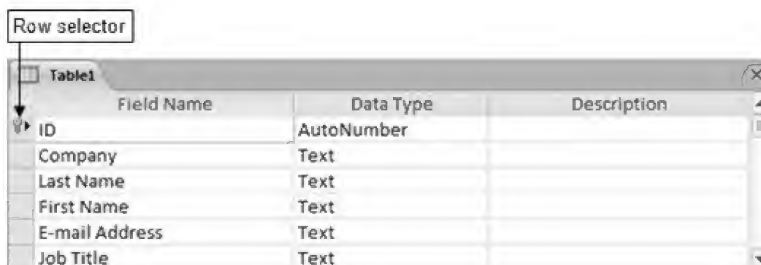


Figure 12.18– Table after setting a Primary Key

## USEFUL TIP

When user saves a table, user is not creating a file instead the user is adding an object to the existing database.

To save a table or tables for the first time:

1. On the Quick Access toolbar, click on the Save button. The **Save As** option dialog box opens.
2. In the Table Name box, type a name for the Table.
3. Click on the OK button. The table appears in the Tables list in the Navigation pane.

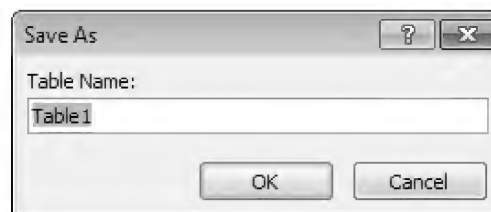


Figure 12.19 – Save As Dialog Box

## 12.4 Editing Tables & Databases

After creating a table, you can modify Table's structure by adding, deleting, or reordering fields. You can also modify Table's data by adding new records, editing existing records, or deleting obsolete records.

### Adding Field

To store a new part of data or information in an existing Table, a user can add a field to the table.

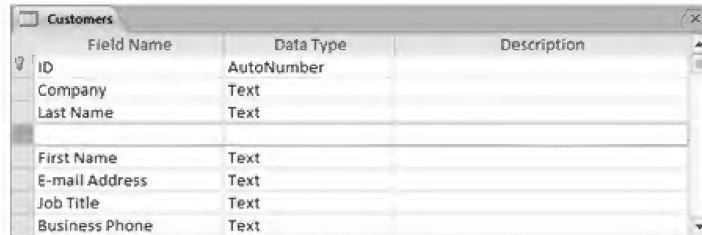
To add a field or fields:

1. In the **Navigation** pane, right click on the table that user wants to edit, and then click **Design**



**View** on the shortcut menu. The table opens in the **Design** view.

- Click the row selector of the field above which you want to insert the new field
- On the Design tab, in the Tool group, click on the Insert Rows button. MS Access inserts a blank row that user can use to define the new field (see Figure 27)
- In the Field Name column, type a name for the new field.
- In the **Data Type** column, click on the down arrow and select a data type for the new field.



Field Name	Data Type	Description
ID	AutoNumber	
Company	Text	
Last Name	Text	
First Name	Text	
E-mail Address	Text	
Job Title	Text	
Business Phone	Text	

Figure 12.20– Table after Inserting a Row

### Deleting Field

If not required, a field can be deleted by the user. Deleting a field gets rid of all the data in that field.

To delete a field or fields:


- In Navigation pane, right click on the table that user wants to edit, and then click Design View on the shortcut menu. The table open in Design view.
- Click on the row selector of the field that user want to delete.
- On the Design tab, in the Tool group, click on the Delete Rows button 
- If the field contains data, a dialog box open and asking user to confirm. Click the Yes button (see Figure below).



Figure 12.21 – Microsoft Access Dialog Box

### Reordering Field

While the order of the fields does not affect how the table functions within the database, it is a good practice to group fields together in some logical order so that they are easy to find,. The Primary Key should be kept at the top of the list.

To move a field or fields:

- In the Navigation pane, right click the table that user wants to edit, and then click on Design View on the shortcut menu. The table opens in the Design view.
- Click on the row selector of the field that user want to move, and then drag the row selector to

the desired location. A line appears to show where the field will be placed when user releases the mouse button (see Figure below).

Field Name	Data Type	Description
ID	AutoNumber	
Company	Text	
Last Name	Text	
First Name	Text	
E-mail Address	Text	
Job Title	Text	
Business Phone	Text	
Home Phone	Text	

Figure 12.22 – Table While Moving a Field

### Adding Records

Every Table has a blank row that follows the last record in the table. This blank row displays an asterisk (\*) on the row selector at the left end of the row (see Figure below). As soon as user begins entering data into the new record row, the asterisk on the row selector changes to a pencil to indicate that the record is being entered or edited and MS Access creates another new record row below it. If there is no data available in the table, only the new record row appear.

ListID	TimeCreated	TimeModified	EditSequence	Name	FullName	IsActive	ParentRefLi	ParentRefFu
930000-104767	3/15/2003 3:31:29 AM	12/15/2016 3:06:59 PM	1481794619	Kern Lighting V	Kern Lighting V	-1	-1	-1
970000-104767	3/15/2003 3:35:03 AM	12/15/2016 3:06:59 PM	1481794619	Store #45	Kern Lighting V	-1	930000-104767	Kern Lighting V
960000-104767	3/15/2003 3:34:18 AM	12/15/2016 3:06:59 PM	1481794619	Store #34	Kern Lighting V	-1	930000-104767	Kern Lighting V
950000-104767	3/15/2003 3:33:41 AM	12/15/2016 3:06:59 PM	1481794619	Store #13	Kern Lighting V	-1	930000-104767	Kern Lighting V
940000-104767	3/15/2003 3:32:59 AM	12/15/2016 3:06:59 PM	1481794619	Store #01	Kern Lighting V	-1	930000-104767	Kern Lighting V
890000-104759	3/14/2003 3:15:41 AM	12/15/2016 3:06:59 PM	1481794619	Stern Commer	Stern Commer	-1	-1	-1
8D0000-104759	3/14/2003 3:22:23 AM	12/15/2016 3:06:59 PM	1481794619	Walker Proper	Stern Commer	-1	890000-104759	Stern Commer
8A0000-104759	3/14/2003 3:17:03 AM	12/15/2016 3:06:59 PM	1481794619	Tittle Propert	Stern Commer	-1	890000-104759	Stern Commer
880000-104759	3/14/2003 3:15:34 AM	12/15/2016 3:06:59 PM	1481794619	Wilson Suites	Stern Commer	-1	890000-104759	Stern Commer
830000-104759	3/14/2003 3:08:47 AM	12/15/2016 3:06:59 PM	1481794619	Thompson Ligh	Thompson Ligh	-1	-1	-1
870000-104759	3/14/2003 3:13:38 AM	12/15/2016 3:06:59 PM	1481794619	Store #15	Thompson Ligh	-1	830000-104759	Thompson Ligh
860000-104759	3/14/2003 3:13:05 AM	12/15/2016 3:06:59 PM	1481794619	Store #20	Thompson Ligh	-1	830000-104759	Thompson Ligh
850000-104759	3/14/2003 3:12:12 AM	12/15/2016 3:06:59 PM	1481794619	Store #30	Thompson Ligh	-1	830000-104759	Thompson Ligh
840000-104759	3/14/2003 3:10:13 AM	12/15/2016 3:06:59 PM	1481794619	Store #40	Thompson Ligh	-1	830000-104759	Thompson Ligh
820000-104759	3/14/2003 3:08:35 AM	12/15/2016 3:06:59 PM	1481794619	Store #50	Thompson Ligh	-1	830000-104759	Thompson Ligh
4F0001-104699	3/7/2003 5:59:55 AM	12/15/2016 3:06:59 PM	1481794619	Baker's Profess	Baker's Profess	-1	-1	-1
8C0000-104759	3/14/2003 3:21:12 AM	12/15/2016 3:06:59 PM	1481794619	Store #05	Baker's Profess	-1	4F0001-104699	Baker's Profess
8B0000-104759	3/14/2003 3:19:19 AM	12/15/2016 3:06:59 PM	1481794619	Store #10	Baker's Profess	-1	4F0001-104699	Baker's Profess
510001-104699	3/7/2003 6:05:37 AM	12/15/2016 3:06:59 PM	1481794619	Store #15	Baker's Profess	-1	4F0001-104699	Baker's Profess
500001-104699	3/7/2003 6:03:24 AM	12/15/2016 3:06:59 PM	1481794619	Store #20	Baker's Profess	-1	4F0001-104699	Baker's Profess

Figure 12.23 – Table in Datasheet View

### To add a record:

1. In the Navigation pane, user can double click the table that user wants to edit. The table opens in the Datasheet view.
2. On the Home tab, in the Record group, click the New button. The insertion point is placed in the first column in the new record row of the table.
3. Enter the required data, and then press the Tab or Enter key to move the insertion point to the next column in the same row.
4. Enter the required data in the remaining columns, pressing the Tab or Enter key after each entry.
5. To save the new record, press Shift + Enter at any place in the record, or press the Tab or Enter key in the last column in the record. Or, on the Home tab, in the Record group, click the Save button.

## USEFUL TIP

- If the data entered by a user violates a field validation rule, MS Access notifies user as soon as user attempt to leave the column. The user must provide a correct value before user can move to another column. Press the Esc key or click the Undo button on the Quick Access toolbar to undo the change to the current value.
- MS Access automatically saves a new record or changes made to an existing record as soon as user moves to another row. Also, MS Access saves records automatically when user closes a table.

### Deleting Records

When user no longer needs a record, user can delete it from the table. Deleting record saves disk space and keeps user tables smaller and manageable.

## USEFUL TIP

Deleted records cannot be recovered.

#### To delete a record:

1. In the Navigation pane, double click on the table that user wants to edit. The table opens in The Datasheet view.
2. Click the row selector of the record that user want to delete.
3. On the Home tab, in the Record group, click the Delete button.
4. The selected record is removed from the table, and a dialog box opens asking user to confirm. Click the Yes button (see Figure below).

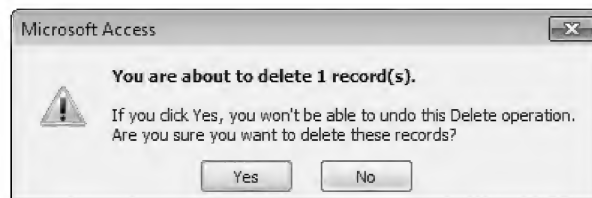


Figure 12.24 – Microsoft Access Dialog Box

### Closing Databases

When user finishes working on a database, user shall close the file. If the database contains any unsaved objects, user will be prompted to save the objects before closing the file.

To close a database:

1. Click on the File tab, and then click Close Database.

## Opening Databases

User can view or edit an existing database by opening it in MS Access. Once the database file is loaded into memory, user can open all the tables or other object within that database.

To open an existing database:

1. Click on the File tab, and then click on Open.
2. In the Open dialog box, locate and select the file that user want to open, and then click the Open button.

Each time user starts MS Access, user opens an instance of it. In a single instance of MS Access, user can have only one database open at a time. Hence to open two MS Access databases at the same time, start MS Access and open the first database, and then start MS Access again and open the second database. Each instance of MS Access runs in a separate window.

When user opens a database that contains potentially unsafe active content such as macros, expressions, action queries, Active Xcontrols or VBA code, a Security Warning message is displayed on the Message bar, just below the Ribbon. If user knows the content is from are liable source, click the Enable Content button on the Message bar (see Figure below).

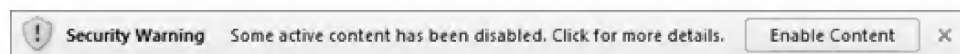


Figure 12.25 – Message Bar

When user opens a database, the file name and location of the database are added to the Recent Databases list which is displayed on the Recent page of the Backstage view (see Figure below). This allows user to quickly access recently used files and databases.

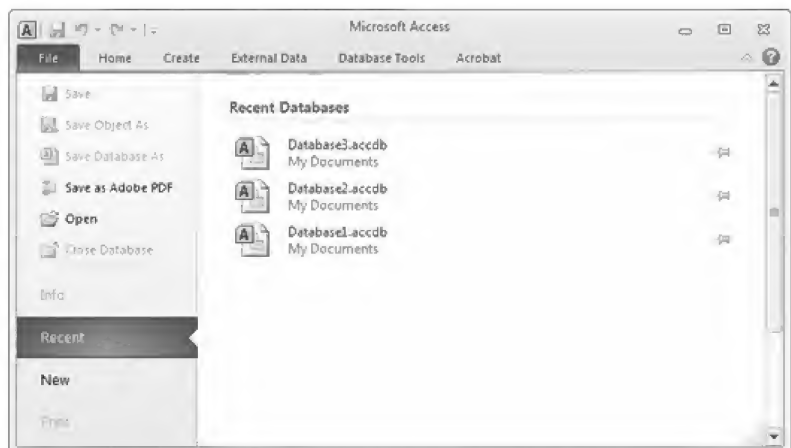


Figure 12.26 – Recent Page of the Back stage View

## 12.5 Working with Database Objects

### 12.5.1 Opening Database Objects

User can open any object in a database by double clicking it in Navigation pane. Every open object

appears on a tab in the Object window. The view in which the data appears depend on the type of object user opens. Tables and queries appear in Datasheet view, Forms appear in Form view, Reports appear in Report view, and Macros and Modules run program attached to the object.

### To Open a Table

1. In Navigation pane, double click on the table that user wants to open. The table opens in the Object window in Datasheet view (see Figure below).

**Tab**

FruitNo	Fruit	Description
1	Apple	Usually red and crunchy, but several varieties exist in different colours
2	Peach	Sometimes fuzzy sometimes not
4	Plum	Usually red and tart, but several varieties exist in different colours and
5	Apricot	Not much to say about these, kinda like plums but not really
6	Tomato	Often thought to be a vegetable
7	Banana	We have no bananas today - Ask Carmen Miranda
8	Kiwi	about the size of a small plum - green and fuzzy
10	Watermelon	we love it
12	Nectarine	Between a peach and a plum
*	(New)	

Record: 8 of 9 No Filter Search

Figure 12.27 – Table in Datasheet View in the Object Window

### USEFUL TIP

If user has multiple objects open in an Object window, user can easily switch between them by clicking on the Object Tab. The active Object Tab is orange and the Tab title is displayed in **bold text**.

### Using Datasheet View







In the Datasheet view, displaying different record or fields is simple. User can use the horizontal scroll bar to scroll through a table's field, or user can use the vertical scroll bar to scroll through a table's records (see Figure below).

ID	Company	Last Name	First Name	E-mail Address	Job Title	Business Phone
1	Company A	Bedecs	Anna		Owner	{123}555-0100
2	Company B	Gratacos Solsona	Antonio		Owner	(123)555-0100
3	Company C	Axen	Thomas		Purchasing Representative	(123)555-0100
4	Company D	Lee	Christina		Purchasing Manager	(123)555-0100
5	Company E	O'Donnell	Martin		Owner	(123)555-0100
6	Company F	Pérez-Olaeta	Francisco		Purchasing Manager	(123)555-0100
7	Company G	Xie	Ming-Yang		Owner	(123)555-0100
8	Company H	Andersen	Elizabeth		Purchasing Representative	(123)555-0100
9	Company I	Mortensen	Sven		Purchasing Manager	(123)555-0100

Record: 1 of 29 No Filter Search

Figure 12.28–Scroll Bars and Record Navigation Bar in Datasheet View

The Record Navigation bar located at the bottom of Object window indicates how many records the table contains and which ones are active and enables user to navigate through the datasheet record:

1. Click on the First record button  to go to the first record in the datasheet.
2. Click on the Previous record button  to go to the previous record in the datasheet.
3. If user knows the record number (the row number of a specific record), click in the Current Record box  enter the record number, and then press the Enter key.
4. Click on the Next record button  to go to the next record in the datasheet.
5. Click on the Last record button  to go to the last record in the datasheet.
6. Click on the New (blank) record button  to go to the new record row in the datasheet.

### Switching Between Views

Every MS Access object has two or more views. For Tables, two most common views are Datasheet view (which allows user to view and modify the table's data), and Design view (which allows user to view and modify the table's structure).

#### To switch between views:

On Home tab, in the Views group, click on the View arrow and select the desired view from the menu or click the desired view button on the View Shortcut toolbar located on the right side of the Status bar.



Figure 12.29 – View Shortcuts Toolbar

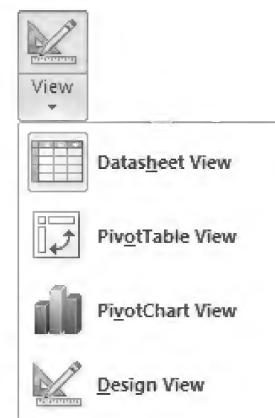


Figure 12.30 – View Menu

## 12.5.2 Closing Database Objects

When user is finished working on a database object, user can close it but can keep database open to work on other objects.

#### To Close a Table:

1. In Object window, select the table that user want to close.
2. Click the Close button in the upper right corner of the Object window.

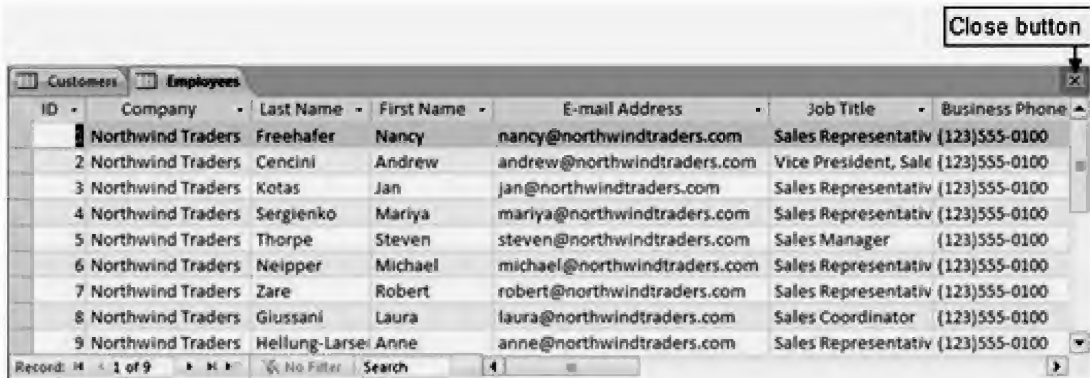


Figure 12.31 – Close Button in the Object Window

## USEFUL TIP

The user can close all open objects at once by right clicking any tab, and then clicking Close All on the shortcut menu.

### 12.5.3 Renaming Database Objects

A user can rename the objects in a database. Before renaming an object, make sure that it is closed.

To rename a table:

In Navigation pane, right click on the table that user wants to rename and then click **Rename** on the shortcut menu. The table name is placed in edit mode. Type a new name and then press the Enter key. Post this change, Tables in the list are reorganized in alphabetical order.

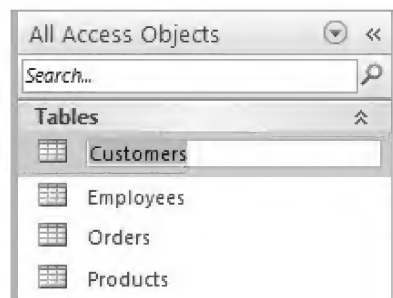


Figure 12.32 – Table Name in Edit Mode

If user enters then a name of a table that already exists in the database, a dialog box opens asking whether user wants to replace the existing table. If user clicks the Yes button, MS Access deletes the old table before performing the renaming operation.

### 12.5.4 Deleting Database Objects

The user can delete an object from a database if it is no longer needed. Before deleting an object, make sure that it is closed.

To delete a table

1. In Navigation pane, right click the table that user wants to delete, and then click Delete on the shortcut menu.
2. A dialog box opens asking user to confirm. Click the Yes button.

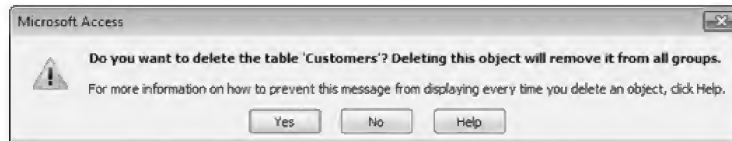


Figure 12.33 – Microsoft Access Dialog Box

## 12.6 Sorting & Filtering

Sorting and filtering features are used to organize your data. When you sort data, you are putting it in order. Filtering data lets you hide unimportant data and focus only on the data you're interested in.

### 12.6.1 Sorting Records

When you sort it means you are arranging records in a particular order. You will normally group logical data together and show them together to read and understand them better and get some meaning out of data.

By default, Access sorts records by their ID numbers. However, there are many other ways records can be sorted. You can sort both text and numbers in two ways: in **ascending order** and **descending order**. Ascending means going up, so an ascending sort will arrange numbers from smallest to largest and text from A to Z. Descending means going down, or largest to smallest for numbers and Z to A for text. The default ID number sort that appears in your tables is an ascending sort, which is why the lowest ID numbers appear first.

#### To Sort Records

Select a field in the cell you want to sort by. In this example, we will sort by Learner's City.

Learner Id	Learner Name	City
123456890	Raja Ram Verma	Jaipur
676752929	Naresh Chandra	Kota
896476567	Ashok Jain	Dholpur
239800999	Ramesh Babu	Jaipur
738889890	Seema Bishnoi	Ajmer
798980976	Rita Rastogi	Jaipur
894565757	Neetu Sharma	Barmer

Figure 12.34 – Sorting Field Selection

Now select Home tab on the Ribbon and locate the **Sort & Filter** group. Sort the field by selecting the Ascending or Descending command. The table now will be sorted by the selected field (City Name).

Learner Id	Learner Name	City
738889890	Seema Bishnoi	Ajmer
894565757	Neetu Sharma	Barmer
896476567	Ashok Jain	Dholpur
798980976	Rita Rastogi	Jaipur
239800999	Ramesh Babu	Jaipur
123456890	Raja Ram Verma	Jaipur
676752929	Naresh Chandra	Kota

Figure 12.35 – Sorting Done



To save the new sort, click **Save** command on the Quick Access Toolbar. After you save the sort, the records will stay sorted that way until you perform another sort or remove the current one. To remove a sort, simply click the **Remove Sort** command. You can also combine multiple fields to sort on the combination on fields.

## 12.6.2 Filtering Records

Filter allows you to view only the data you want to see and work on. When you create a filter, you set criteria for the data you want to display. The filter then searches all of the records in the table, finds the ones that meet your search criteria, and temporarily hides the ones that don't.

Filters are useful because they allow you to focus in on specific records without being distracted by the data you're uninterested in. For instance, if you had a database that included learners and ITGK information, you could create a filter to display only learners studying within a certain city or only ITGKs that operate in a certain city. Viewing this data with a filter would be far more convenient than searching for it in a large table.

### To Create a Filter:

Click the drop-down arrow next to the field you want to filter by. We will filter by City because we want to see a list of learners who live in a certain city.



Figure 12.36 – Filtering Selection

A drop-down menu with a checklist will appear. Only checked items will be included in the filtered results. Use the following options to determine which items will be included in your filter:

- Select and deselect items one at a time by clicking their check boxes. Here, we will deselect all of the options except for **Jaipur**.
- Click Select All to include every item in the filter. Clicking Select All a second time will deselect all items.

- Click Blank to set the filter to find only the records with no data in the selected field.

Click **OK**. The filter will be applied. Our customers table now displays only learners who live in **Jaipur**.



Figure 12.37 – Filtering Done

Toggle your filter allows you to turn it on and off. To view records without the filter, simply click the Toggle Filter command. To restore the filter, click it again.

Filtering by selection allows you to select specific data from your table and find data that is similar or dissimilar to it. For instance, if you were working with a Learner's database and wanted to search for all learners whose names contained the word **Shankar**, you could select that word in one Learner name and create a filter with that selection. Creating a filter with a selection can be more convenient than setting up a simple filter if the field you're working with contains many items.

## 12.7 Indexes

You can use an index to help Access find and sort records faster. An index stores the location of records based on the field or fields that are part of the index. Depending on the number of unique values of the indexed fields, an index can be much smaller than the table it describes, making it more efficient for Access to read.

In Access, an index is like a list of field values that appear in a table. Each entry in the list also shows the locations for the records that contain the field values. If you want to find a particular field value, an index makes it much faster than reading through the whole table.

The larger the number of different field values in a table, the more an index helps improve search and select query performance. The more frequently a given field value appears in a table, the less improvement an index will provide.

After Access obtains the location of the records from the index, it can retrieve the data from those records by moving directly to the correct location. In this manner, using an index can be much faster than scanning through all the records in the table to find the data.

When you append, delete, or update data, any indexes on the affected tables must be updated to reflect the changes. This can impede performance. Again, think of a book: if you make changes, the index must also change or it will be inaccurate. Changing the index takes time, and that is time

that you would not spend if there were no index. Access works the same way: indexes make changing your data take longer.

You can create an index that is based on a single field or on multiple fields. You should consider indexing fields that you search frequently, fields that you sort, and fields that you join to fields in other tables in queries. Indexes can help speed up searches and select queries, but they can slow down performance when you add or update data.

When you enter data in a table that contains one or more indexed fields, Access must update the indexes every time a record is added or changed. Adding records by using an append query or by appending imported records is also likely to be slower if the destination table contains indexes.

### USEFUL TIP

The primary key of a table is automatically indexed.

## 12.7.1 Create an Index

To create an index, you first decide whether you want to create a single-field index or a multiple-field index. You create an index on a single field by setting the **Indexed** property. The following table lists the possible settings for the **Indexed** property.

Indexed property setting	Meaning
No	Don't create an index on this field (or delete the existing index)
Yes (Duplicates OK)	Create an index on this field
Yes (No Duplicates)	Create a unique index on this field

Table 12.4 Index Property Settings

If you create a unique index, Access doesn't let you enter a new value in the field if that value already is in the same field in another record. Access automatically creates a unique index for primary keys, but you might also want to prevent duplicate values in other fields. For example, you can create a unique index on a field that stores serial numbers so that no two products have the same serial number.

### Create a single-field Index

1. In the Navigation Pane, right-click the name of the table that you want to create the index in, and then click **Design View** on the shortcut menu.
2. Click the **Field Name** for the field that you want to index.
3. Under **Field Properties**, click the **General** tab.
4. In the **Indexed** property, click **Yes (Duplicates OK)** if you want to enable duplicates, or **Yes**

(**No Duplicates**) to create a unique index.

5. To save your changes, click **Save** on the **Quick Access Toolbar**, or press CTRL+S.

### Create a multiple-field Index

1. In the Navigation Pane, right-click the name of the table that you want to create the index in, and then click **Design View**.
2. On the **Design** tab, in the **Show/Hide** group, click **Indexes**.

The Indexes window appears. Resize the window so that some blank rows appear and the index properties are shown.

To create a multiple-field index for a table, you include a row in the Indexes window for each field in the index and include the index name only in the first row. Access treats all rows as part of the same index until it comes to a row that contains another index name. To insert a row, right-click the location where you want to insert a row, and then click **Insert Rows** on the shortcut menu.

3. In the **Index Name** column, in the first blank row, type a name for the index. You can name the index after one of the index fields, or use another name.
4. In the **Field Name** column, click the arrow and then click the first field that you want to use for the index.
5. In the next row, leave the **Index Name** column blank, and then, in the **Field Name** column, click the second field for the index. Repeat this step until you select all the fields that you want to include in the index.

**Note** The default sort order is Ascending

6. To change the sort order of the field's values, in the **Sort Order** column of the Indexes window, click **Ascending** or **Descending**.
7. In the **Indexes** window, under **Index Properties**, specify the index properties for the row in the **Index Name** column that contains the name of the index. Set the properties according to the following table.

Label	Value
Primary	If <b>Yes</b> , the index is the primary key.
Unique	If <b>Yes</b> , every value in the index must be unique.
Ignore Nulls	If <b>Yes</b> , records with a Null value in the indexed fields are excluded from the index.

Table 12.5 Index Properties

1. To save your changes, click **Save** on the **Quick Access Toolbar**.

Keyboard shortcut Press CTRL+S.

2. Close the Indexes window.

### 12.7.2 Delete an Index

If you find that an index becomes unnecessary or has too great an effect on performance, you can delete it. When you delete an index, you remove only the index and not the field or fields on which it is built.

1. In the Navigation Pane, right-click the name of the table that that you want to delete the index in, and then click **Design View** on the shortcut menu.

2. On the **Design** tab, in the **Show/Hide** group, click **Indexes**.

The Indexes window appears. Resize the window so that some blank rows appear and the index properties are shown.

3. In the Indexes window, select the row or rows that contain the index that you want to delete, and then press DELETE.

#### USEFUL TIP

Make sure that you select the whole row.

4. To save your changes, click **Save** on the **Quick Access Toolbar**.

Keyboard shortcut Press CTRL+S.

5. Close the Indexes window.

### 12.7.3 View and edit Indexes

You might want to see the indexes for a table to weigh their effect on performance, or to make sure that particular fields are indexed.

1. In the Navigation Pane, right-click the name of the table that you want to change the index in, and then click **Design View** on the shortcut menu.

2. On the **Design** tab, in the **Show/Hide** group, click **Indexes**.

The Indexes window appears. Resize the window so that some blank rows appear and the index properties are shown.

3. View or edit the indexes and index properties to suit your needs.

4. To save your changes, click **Save** on the **Quick Access Toolbar**.

Keyboard shortcut Press CTRL+S.

5. Close the Indexes window.

### Multiple Choice Questions

1. ACID's Properties are.....
  - a. Atomicity & Consistency
  - b. Isolation & Durability
  - c. a and b
  - d. None of the above
2. What is the disadvantage of a DBMS?
  - a. Data security and integrity
  - b. Complexity
  - c. Data independence
  - d. Crash recovery and concurrent access
3. Data models define how the .....of a database is modeled.
  - a. logical structure
  - b. object model
  - c. a and b
  - d. None of the above
4. User cannot enter or change the data in ..... Type of field.
  - a. Number                      b. Number
  - c. Auto Number              d. Date/Time
5. MS Access 2010 creates database in the .....file format as default.
  - a. .mdb                          b. .accdB
  - c. .mbdx                        d. None of the above
6. A primary key consists of .....
  - a. Duplicate values      b. Unique values
  - c. a and b                      d. None of the above
7. In the 'View Shortcuts Toolbar' which options are not available?
  - a. Design view              b. Pivot Table view
  - c. Pivot Chart view      d. Sheet view
8. What are the available database objects in MS Access 2010?
  - a. Macros                      b. Forms
  - c. Reports                      d. All of the above
9. In MS Access 2010, what are the options available in 'Quick Select'?
  - a. Selection                      b. Toggle Filter
  - c. Filter                          d. All of the above
10. User can create a new table by using .....
  - a. Design view              b. Datasheet view
  - c. a and b                      d. None of the above